

**ARTS IMPACT LESSON PLAN**

**Dance and Math Infused Lesson**

**Lesson Two: *Word Problem Choreography***

Author: Debbie Gilbert      Grade Level: Second



**Enduring Understanding**

Movements or numbers can represent addition or subtraction solutions to a word problem.

**Lesson Description (Use for family communication and displaying student art)**

*In this math and dance lesson, students solve word problems by choreographing dances. They explore the dance concepts of self & general space and smooth & sharp energy. With a partner, they write an equation to solve the word problem and dance the solution. They perform for each other and describe the dances they observed.*

**Learning Targets and Assessment Criteria**

**Target:** Represents the solution to a word problem with movement.

**Criteria:** Creates sharp and smooth movements that equal the total number of counts in the story problem (16).

**Target:** Writes the equation that equals the number of counts in the dance.

**Criteria:** Notates two unknown addends that match the counts in the dance using the following form:  $\square + \square = 16$  and  $16 = \square + \square$ .

Vocabulary	Materials	Learning Standards
<p><u>Arts Infused:</u> Count Solve</p> <p><u>Math:</u> Addends Addition Equals Equation Subtraction Sum Word Problem</p> <p><u>Arts:</u> Choreographer General space Self-space Shape Sharp energy Smooth energy</p>	<p><b>Museum Artworks or Performance</b></p> <p><b>Seattle, WA</b> Pacific Northwest Ballet UW World Series of Dance</p> <p><b>Tacoma, WA</b> Broadway Center for the Performing Arts</p> <p><b>Materials</b> <i>Math Dances</i> CD by Debbie Gilbert; CD player; White board or chart paper &amp; markers; Computer with internet connection and projector; Document camera (optional); 8.5x11" white copy paper: copy Word Problem Choreography Student Worksheet, one per student; Writing pencils; drum or percussion instrument; Class Assessment Worksheet</p>	<p><b>WA Arts State Grade Level Expectations</b> <i>For the full description of each WA State Arts Grade Level Expectation, see: <a href="http://www.k12.wa.us/Arts/Standards">http://www.k12.wa.us/Arts/Standards</a></i></p> <p>1.1.1 Elements: Shape, Space 1.1.3 Elements: Energy 1.2.1 Skills and Techniques: Locomotor and Non-locomotor Movements 1.4.1 Audience Skills <b>2.1.1 Creative Process</b> 2.2.1 Performance Process 2.3.1 Responding Process 4.2.1 Connection between Dance and Math</p> <p><b>Early Learning Guidelines (Pre-K – Grade 3)</b> <i>For a full description of Washington State Early Learning and Child Development Guidelines see: <a href="http://www.del.wa.gov/development/guidelines/">http://www.del.wa.gov/development/guidelines/</a> (2<sup>nd</sup> grade) 6. Learning about my world: Math: solve challenging addition and subtraction word (story) problems; describe thinking when solving a math problem and discuss why he or she solve the problem in a particular way; begin to understand how math is used in everyday life. Arts: try different types of movement and dance; pay attention to performances, and describe them to others.</i></p> <p><b>Common Core State Standards (CCSS) in Math</b> <a href="http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx">http://www.k12.wa.us/CoreStandards/Mathematics/default.aspx</a> 2.OA. Represent and solve problems involving addition and subtraction.</p>
	<p><i>continued</i></p>	<p><i>continued</i></p>

Pacific Northwest Ballet images:  
Dancers in George Balanchine's *Serenade*;  
Choreography © The George Balanchine  
Trust



James Moore and Choreographer Marcko  
Goeke in rehearsal for *Place a Chill*



©Angela Sterling

#### **Video**

*Polyphonia* excerpts (Video link provided  
to Arts Impact, courtesy Pacific Northwest  
Ballet)

<http://www.youtube.com/watch?v=MOhvlhQo8A>

Mark Morris Dance Group presents  
Festival Dance & more!

<http://www.youtube.com/watch?v=f1OVdVeiQr0>

Juliet's solo Act III, *Roméo et Juliette*  
(Video link provided to Arts Impact,  
courtesy Pacific Northwest Ballet)


<http://www.youtube.com/watch?v=n7DOjLknsL4>

2.OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.  
2.OA.2. Fluently add & subtract within 20 using mental strategies.

#### **CCSS Mathematical Practices**

MP.1. Make sense of problems & persevere in solving them.  
MP.2. Reason abstractly and quantitatively.  
MP.3. Construct viable arguments and critique the reasoning of others.  
MP.4. Model with mathematics.

### ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

### Pre-Teach

Practice the *Math BrainDance*, see lesson step 3. Practice addition and subtraction with word problems.

### Lesson Steps Outline

**1.** Introduce dancing solutions to word problems.


**2.** Remind students about agreements for appropriate dance behavior.

**3.** Lead students in *Math BrainDance* warm-up.

Music: "Math BrainDance (Second Grade)" #3, *Math Dances* by Debbie Gilbert

**4.** Analyze photographs or video of dancers using smooth and sharp energy.


Guide an exploration moving with sharp and smooth energy in self-space, general space, and freezing in shapes. Use a drum for accompaniment.

 Criteria-based process assessment: Moves with smooth and sharp energy and freezes in shapes.


**5.** Demonstrate creating a dance to solve a word problem.

Music: "Equals 16" #9, *Math Dances* by Debbie Gilbert

**6.** Support students as they create dances to solve the word problem. Ask students to find partners, or assign them. Distribute worksheets.

 Criteria-based teacher checklist, self-assessment: Creates sharp and smooth movements that equal the total number in the story problem (16). Notates two unknown addends that match the counts in the dance using the following form:  
 $\square + \square = 16$  and  $16 = \square + \square$ .

**7.** Facilitates performance of word problem dance and response. Half of the class will perform and half will be the audience. Discuss performer and audience behavior.

 Criteria-based teacher checklist, peer assessment: Creates sharp and smooth movements that equal the total number of counts in the story problem (16).

**8.** Guide class reflection connecting dance and math.

 Criteria-based reflection: Makes a connection between dance and math.

## LESSON STEPS

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- ▣ Prepare the classroom for dance.



Moving Desks/Set-up

### 1. Introduce dancing solutions to word problems.

- *This is a lesson that is a dance lesson and a math lesson at the same time. We'll be Dancing Mathematicians and solve word problems to create a dance.*
- *Our word problems will be about choreographers. Choreographers are the people who come up with the ideas and create a dance — the inventors of dances.*
- *Let's do a quick word problem with mental math. The choreographer has a piece of music that is twelve counts long. She creates one movement (wiggling her hands) that is eight counts long. How many counts does she have for her second movement?*
- *Can someone help me write an equation on the board to help me solve that problem? (e.g.  $12 = 8 + \square$ ,  $12 - 8 = \square$ , or  $8 + \square = 12$ )*
- *How many counts does she need for the second movement? (4) What movement should she do with her shoulders? (e.g. shrug)*
- *Let's do the dance: eight wiggles plus four shoulder shrugs equals twelve counts.*

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### 2. Remind students about agreements for appropriate dance behavior.

- *Remind me, how can you be creative and safe at the same time?*



Movement Safety

**3. Lead students in *Math BrainDance* warm-up.** (BrainDance originally developed by Anne Green Gilbert, [www.creativedance.org](http://www.creativedance.org), reference: *Brain-Compatible Dance Education*, video: *BrainDance, Variations for Infants through Seniors*.)  
Music: "Math BrainDance (Second Grade)" #3, *Math Dances* by Debbie Gilbert

- *The BrainDance is designed to warm up your body and make your brain work better at the same time. Notice when we count in the BrainDance.*



BrainDance by Artist Mentor

#### Breath

- *Dancing Mathematicians, breathe calmly.*



BrainDance by Students

#### Tactile

- *Tap from the top of your head all the way to your toes. We'll count by fives to eighty: 5, 10, 15, 20 ... 80.*

#### Core-Distal

- *Grow into a huge quadrilateral shape and shrink into a small shape.*

### Head-Tail

- *Curl your backbone forwards and backwards and from side to side. We'll count by tens starting at fifty and go to one hundred twenty: 50, 60, 70 ... 120.*

### Upper Half

- *Smoothly move the whole top of your body while the lower half freezes. Draw giant three-digit numbers with your arms.*

### Lower Half

- *Smoothly move the whole lower half of your body while the upper half freezes. Draw giant three-digit numbers with your legs.*

### Body-Half Right

- *Move sharply with the right side of your body while the left side is frozen. Draw a huge triangle, a quadrilateral, a pentagon, and a hexagon.*

### Body-Half Left

- *Move sharply with the left side of your body while the right side is frozen. Draw a huge triangle, a quadrilateral, a pentagon, and a hexagon.*

### Eye-Tracking

- *Focus on your right thumb. Move it from one side to the other and up and down. Watch your left thumb moving from side to side and up and down.*

### Cross-Lateral

- *Reach across your body up high, up high, down low, down low. We'll count by 100's starting at 100 and go to 1,600: 100, 200, 300 ... 1,600.*

### Vestibular

- *Turn, then freeze in a triangle shape. Turn, then freeze in a quadrilateral shape. Turn, then freeze in a pentagon shape. Turn, then freeze in a hexagon shape.*

### Breath

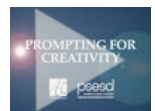
- *Breathe calmly, Dancing Mathematicians.*

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## 4. Analyze photographs or video of dancers using **smooth energy** and **sharp energy**. Guide an exploration moving with **sharp and smooth energy in self-space, general space,** and freezing in **shapes.**

### Use a drum for accompaniment.

☐ If you choose to use photographs, you may use these photos: Pacific Northwest Ballet: Dancers in George Balanchine's *Serenade* and James Moore and Choreographer Marcko Goeke in rehearsal for *Place a Chill*. You could also choose to find your own photos or videos that represent a variety of styles and cultures. You could review, for example, The UW World Dance Series, <http://uwworldseries.org/world-dance>.



Prompting for Creativity



- *We are going to be dancing with smooth energy and sharp energy.*
- *Here is a photograph of dancers from Pacific Northwest Ballet. What do you see that looks smooth? Why?*
- *Here is a picture of a dancer and a choreographer, the inventor of the dance. What do you see that looks sharp? Why?*

☰ If you choose to use video, show one or more of the following video clips of professional dancers. Ask students to identify when the dancers are moving with sharp movements or smooth movements. If time is limited, you could do this part of the strategy on another day.

*Polyphonia* excerpts (Video link provided to Arts Impact, courtesy Pacific Northwest Ballet)  
<http://www.youtube.com/watch?v=MOhvllhQo8A>

Mark Morris Dance Group presents Festival Dance & more!  
<http://www.youtube.com/watch?v=f1OVdVeiQr0>

Juliet's solo Act III, *Roméo et Juliette* (Video link provided to Arts Impact, courtesy Pacific Northwest Ballet)  
<http://www.youtube.com/watch?v=n7DOjLknsL4>

- *Put on a space bubble so you won't touch anyone.*
- *We are going to do different movements in self-space. That means you will stay on one spot. Use your whole body when you move — your head, your arms, your legs, and your back!*
- *We'll move for ten counts and then freeze in a shape, like a statue. Count out loud when you move. When you freeze, it is OK to breathe and to blink.*
- *Sharp movements are jerky. They stop and start. Move sharply in one spot: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Freeze.*
- *Smooth movements are flowing. They keep going and don't stop. Move smoothly in one spot: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Freeze.*
- *Did you notice how when we did sharp movements you did ten sharp movements in ten counts, but when we did smooth movements, we did one smooth movement that took ten counts? Let's repeat that and do ten sharp movements and then one smooth movement that lasts for ten counts.*

- *Did you notice how when we did sharp movements you did ten sharp movements in ten counts, but when we did smooth movements, we did one smooth movement that took ten counts? Let's repeat that and do ten sharp movements and then one smooth movement that lasts for ten counts.*
- *When dancers travel through the empty space in the room, they call that dancing in general space.*
- *Do a smooth movement in general space: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Freeze. Repeat.*
- *Do sharp movements in general space: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Freeze. Repeat.*
- *What smooth and sharp movements did you do?*
- *Choreographers can use self and general space and smooth and sharp energy to create dances!*

**Criteria-based process assessment:** Moves with smooth and sharp energy and freezes in shapes.

## **5. Demonstrate creating a dance to solve a word problem.**

Music: "Equals 16" #9, *Math Dances* by Debbie Gilbert

▮ The music begins with four beats for nothing for the dancers to be frozen in a beginning shape and listening to the tempo. Next is music that is 16 counts long. You can also choose to use no music at all and just count the 16 counts vocally, or you can use a drum or other percussion instrument.

▮ You can choose to project the word problem from the student worksheet with a document camera.

- *I am going to be a Dancing Mathematician and create a dance to solve this word problem: The choreographer has been asked to create a dance that is 16 counts long. The dance needs sharp movement and smooth movement. How many counts should the sharp movement be? How many counts should the smooth movement be?*
- *I need to solve this equation to be able to make my dance:  $\square + \square = 16$ . I can also write my equation like this:  $16 = \square + \square$ .*
- *Is there only one right answer to this equation? How would you solve this? (Students respond.)*
- *So as a choreographer, I have many choices. For my dance, I'll do  $4 + 12 = 16$ . I can also say  $16 = 4 + 12$ . For my four counts, I'll do four sharp walks in general space. For my twelve counts, I'll do one smooth turn in self-space. So I've used smooth and sharp energy. I've also used both self and general space to make the dance more interesting. I've made a dance with a total of 16 counts and it looks like this. (Demonstrate.)*

▮ Count in a soft voice while moving.

## 6. Support students as they create dances to solve the word problem. Ask students to find partners, or assign them. Distribute worksheets.



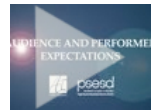
Word Problem Dance

☐ When assessing this criteria, you may want to use a reverse checklist, putting a “0” where students have not met criteria, rather than trying to notate every single one who has met criteria. You can go back later and give those who have met criteria a “1.” This information will let you know what and who needs more practice, so you can return to it in the future. You can choose to use the checklist during rehearsal or wait until the performance.

- *Find a partner and create a dance that solves this word problem: The choreographer has been asked to create a dance that is 16 counts long. The dance needs sharp movement and smooth movement. How many counts should the sharp movement be? How many counts should the smooth movement be?*
- *Write your equation on the worksheet.*
- *After you have calculated how many counts the smooth and sharp movements should be, think about what sharp and smooth movements you will use. They can be in self or general space. You can count in a soft voice to help you and your partner stay together.*
- *Practice your dance. Begin by freezing in a shape. Do your dance. Freeze at the end.*
- *Does your dance match the equation you wrote? How do you know that’s true?*

☑ Criteria-based teacher checklist, self-assessment: Creates sharp and smooth movements that equal the total number of counts in the story problem (16). Notates two unknown addends that match the counts in the dance using the following form:  $\square + \square = 16$  and  $16 = \square + \square$ .

## 7. Facilitates performance of word problem dance and response. Half of the class will perform and half will be the audience. Discuss performer and audience behavior.



Performer and Audience Expectations

- *Before we begin, remind me what is the job of the audience? What is the job of the performers?*
- *Audience, after the performance, I’ll ask you to describe the sharp and smooth movements you saw and how you knew the dancers solved the word problem.*
- *How were the dances the same? How were they different?*

☑ Criteria-based teacher checklist, peer assessment: Creates sharp and smooth movements that equal the total number of counts in the story problem (16).

## 8. Guide class reflection connecting dance and math.

- *Dancing Mathematicians, today, you danced the solution to word problems. Turn and talk to someone close to you. What did you discover?*
- *The next time in math that you work with word problems, remember how you solved them with your whole bodies in movement.*

☑ Criteria-based reflection: Makes a connection between dance and math.



## Word Problem Choreography Student Worksheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

*The choreographer has been asked to create a dance that is 16 counts long. The dance needs sharp movement and smooth movement. How many counts should the sharp movement be? How many counts should the smooth movement be?*

*Our dance has \_\_\_\_\_ counts of sharp movement.*

*Our dance has \_\_\_\_\_ counts of smooth movement.*

*Fill in the boxes to match the number of sharp and smooth movements in your dance.*

$$\square \text{ sharp} + \square \text{ smooth} = 16 \text{ counts}$$

$$16 \text{ counts} = \square \text{ sharp} + \square \text{ smooth}$$

**ARTS IMPACT LESSON PLAN Dance and Math Infusion**

Second Grade Lesson Two: *Word Problem Choreography*

Teachers may choose to use or adapt the following self-assessment tool.

**STUDENT SELF-ASSESSMENT WORKSHEET**

Disciplines	DANCE		MATH	Total 3
Concept	Smooth and Sharp Energy		Addition	
Criteria	Creates smooth and sharp movements that equal the total number of counts in the story problem (16).		Notates two unknown addends that match the counts in the dance using the following form: $\square + \square = 16$ and $16 = \square + \square$ .	
Student Name	Smooth	Sharp		

**ARTS IMPACT LESSON PLAN Dance and Math Infusion**

Second Grade Lesson Two: *Word Problem Choreography*

**CLASS ASSESSMENT WORKSHEET**

Disciplines	DANCE		MATH	Total 3
Concept	Smooth and Sharp Energy		Addition	
Criteria	Creates smooth and sharp movements that equal the total number of counts in the story problem (16).		Notates two unknown addends that match the counts in the dance using the following form: $\square + \square = 16$ and $16 = \square + \square$ .	
Student Name	Smooth	Sharp		
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
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20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				
Total				
Percentage				

*What was effective in the lesson? Why?*

*What do I want to consider for the next time I teach this lesson?*

*What were the strongest connections between dance and math?*

Teacher: \_\_\_\_\_

Date: \_\_\_\_\_

**DANCE AND MATH LESSON: *Word Problem Choreography***

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Dear Family:

Today your child participated in an **Arts and Math** lesson. We talked about how both mathematicians and dancers can solve word problems.

- We did the Math BrainDance to warm up our brains and bodies.
- We explored the dance concepts of self-space (moving in one spot) and general space (moving while traveling) and smooth energy (flowing without stopping) and sharp energy (jerky, starting and stopping).
- We wrote equations to solve this word problem: The choreographer has been asked to create a dance that is 16 counts long. The dance needs sharp movement and smooth movement. How many counts should the sharp movement be? How many counts should the smooth movement be?
- We created a dance to show our solution.
- We performed for each other and described the dances we observed.
- We thought about how solving word problems with movement can help us solve them in math.

At home, you could write a word problem together. Ask your child to help you dance a solution.

**Enduring Understanding**

Movements or numbers can represent addition or subtraction solutions to a word problem.